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CLAIMS:

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1. A method of producing a macroporous ceramic foam  
for use in biomedical applications and having an open  
foam structure containing pores with a modal diameter  
 $d_{mode} \geq 100 \mu\text{m}$ , which method comprises:

10 (a) forming a ceramic slip comprising a substantially  
homogeneous mixture of a ceramic particulate, an  
organic binder in a liquid carrier, and  
optionally one or more surfactants, wherein at  
least one surfactant is present if the organic  
binder does not function as a surfactant, and  
wherein the ceramic slip preferably has a  
viscosity in the range of from 15 to 200 mPas;

15 (b) foaming the ceramic slip using a ball mill; and  
(c) heating the foamed ceramic slip at a temperature  
sufficient to substantially burn out the organic  
binder.

2. A method as claimed in claim 1, wherein foaming  
of the ceramic slip is achieved using a ball mill with  
25 milling media selected from alumina ( $\text{Al}_2\text{O}_3$ ), enstatite  
( $\text{MgSiO}_3$ ) or zirconia ( $\text{ZrO}_2$ ) balls.

3. A method as claimed in claim 2, wherein the balls  
of the milling media have a diameter in the range of  
30 from 10 to 30 mm, preferably from 15 to 25 mm.

Sub P  
4. A method as claimed in any one of the preceding  
claims, wherein foaming of the ceramic slip is  
achieved using a ball mill in conjunction with gassing.

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- and/or a blowing agent.
5. A method as claimed in any one of the preceding claims, wherein the ceramic slip has a viscosity in  
the range of from 30 to 100 mPas.
6. A method as claimed in any one of the preceding claims, wherein the ceramic particulate is  
biocompatible.
- 10 7. A method as claimed in any one of the preceding claims, wherein the ceramic particulate comprises one or more of hydroxyapatite, a substituted-hydroxyapatite, a glass, an AW-Glass ceramic and/or alumina.
- Sub 15 AX 20 8. A method as claimed in any one of the preceding claims, wherein the ceramic particulate has a  $d_{50}$  of from 1 to 300  $\mu\text{m}$ , preferably from 1 to 15  $\mu\text{m}$ .
9. A method as claimed in any one of the preceding claims, wherein the ceramic particulate has a surface area in the range of from 5 to 200  $\text{m}^2\text{g}^{-1}$ .
- 25 10. A method as claimed in any one of the preceding claims, wherein the organic binder comprises one or more of poly(vinyl alcohol), poly(vinyl pyrrolidone), alginate, poly(lactic acid), poly(vinyl butyral), poly(ethylene glycol) and/or poly(vinyl acetate).
- 30 11. A method as claimed in any one of the preceding claims, wherein the liquid carrier comprises water, propan-2-ol or trichloroethane.

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Cont

Sub A2

12. A method as claimed in any one of the preceding claims, wherein the organic binder is present in the liquid carrier in an amount of from 0.2 to 10 w/v%.

Sub 54

13. A method as claimed in claim 12, wherein the organic binder is present in the liquid carrier in an amount of from 0.5 to 6 w/v%, preferably from 0.5 to 4 w/v%.

Sub 29/3

14. A method as claimed in any one of the preceding claims, wherein the ceramic slip comprises from 10 to 95 w/v% ceramic particulate.

Sub 15

15. A method as claimed in claim 14, wherein the ceramic slip comprises from 20 to 90 w/v% ceramic particulate, preferably from 40 to 80 w/v% ceramic particulate.

Sub 20/4

16. A method as claimed in any one of the preceding claims, wherein the ceramic slip further comprises one or both of a dispersant and/or a defloculant.

Sub A4

17. A method as claimed in any one of the preceding claims, wherein prior to burn-out of the organic binder the liquid carrier is allowed to evaporate from the foamed ceramic slip.

18. A method as claimed in claim 17, wherein the foamed ceramic slip is heated at a temperature in the range of from 20 to 100°C to facilitate evaporation of the liquid carrier prior to burn-out of the organic binder.

Sub X

19. A method as claimed in claim 17 or claim 18,

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Cont.

AS

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wherein the concentration of the organic binder in the liquid carrier is selected such that the percentage of binder remaining after substantially all of the liquid carrier has been evaporated is from 0.5 to 10 w/w%.

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20. A method as claimed in claim 19, wherein the concentration of the organic binder in the liquid carrier is selected such that the percentage of binder remaining after substantially all of the liquid carrier has been evaporated is in the range of from 1 to 6 w/w%, preferably from 1 to 4 w/w%.

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21. A method as claimed in any one of the preceding claims, wherein the foamed ceramic slip is cast in a mould having a surface coated with a release agent.

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22. A method as claimed in any one of the preceding claims, wherein burn-out of the organic binder is carried out at a temperature in the range of from 150 to 700°C.

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23. A method as claimed in any one of the preceding claims, further comprising sintering the ceramic foam following burn-out of the organic binder.

24. A method as claimed in claim 23, wherein sintering is carried out at a temperature in the range of from 500 to 1600°C.

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25. A method as claimed in claim 23 or claim 24, wherein the sintered ceramic foam has a bulk porosity in the range of from 40 to 95%, preferably from 70 to 90%.

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S/Jb  
26. A method as claimed in any one of claims 23 to 25, wherein the sintered ceramic foam has a strut density in the range of from 60 to 95%, preferably from 70 to 90% of the theoretical density of the ceramic.

S/Jb  
AA  
27. A method as claimed in any one of claims 23 to 26, wherein the sintered ceramic foam has a modal pore size in the range of from 100 to 2000  $\mu\text{m}$ , preferably from 100 to 1000  $\mu\text{m}$ .

S/Jb  
AB  
28. A macroporous ceramic foam obtainable by a method according to any one of the preceding claims.

15 29. ~~A synthetic bone material which comprises a macroporous ceramic foam as claimed in claim 28.~~ B

S/Jb  
30. A composition which comprises a macroporous ceramic foam as claimed in claim 28 or a synthetic bone material as claimed in claim 29 together with a pharmaceutically acceptable diluent or carrier.

S/Jb  
31. A bone implant, filler, cement, tissue engineering scaffold, synthetic bone graft or drug-delivery device which comprises a macroporous ceramic foam as claimed in claim 28, a synthetic bone material as claimed in claim 29 or a composition as claimed in claim 30.

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